

60,246-236, 10,760

IN THE CLAIMS

1. (Currently Amended) A method of monitoring an amount of refrigerant in a refrigerant system having an electric motor driven compressor, a condenser and an evaporator; determining a temperature difference between a saturation condensing temperature and a liquid refrigerant temperature of sub-cooled refrigerant; and automatically determining a variance between the determined temperature difference and a desired temperature difference, and utilizing said variance to determine whether the amount of refrigerant in the refrigerant system is as desired.
2. (Original) The method of claim 1, including determining whether the variance exceeds a selected threshold.
3. (Original) The method of claim 2, including providing an indication of an undesirable amount of refrigerant in the system when the determined difference exceeds the selected threshold.
4. (Original) The method of claim 1, including determining the temperature difference when the system is operating to provide cooling.
5. (Currently Amended) A method of claim 1, of monitoring an amount of refrigerant in a refrigerant system having an electric motor driven compressor, a condenser and an evaporator;

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determining a temperature difference between a saturation condensing temperature and a liquid refrigerant temperature of sub-cooled refrigerant; and
automatically determining a variance between the determined temperature difference and a desired temperature difference, including determining the temperature difference when the system is operating to provide heating.

6. (Original) The method of claim 1, including determining whether the amount of refrigerant in the system is above or below a desired level.

7. (Currently Amended) A refrigerant system, comprising:

at least one sensor that provides an indication of a temperature difference between a saturation condensing temperature and a liquid refrigerant temperature of sub-cooled refrigerant;
and

a controller that uses the temperature difference to determine if the amount of refrigerant within the refrigerant system is different from a desired amount.

8. (Original) The system of claim 7, wherein the controller determines a difference variance between the indicated temperature difference and an expected temperature difference and uses the determined variance to determine whether the amount of refrigerant in the system is different than the desired amount.

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9. (Original) The system of claim 8, wherein the controller determines whether the variance exceeds a selected threshold.

10. (Currently Amended) A The refrigerant system of claim 7, comprising:
at least one sensor that provides an indication of a temperature difference between a saturation condensing temperature and a liquid refrigerant temperature of sub-cooled refrigerant;
and

a controller that uses the temperature difference to determine if the amount of refrigerant is different from a desired amount, -wherein the controller also uses at least one of a compressor free volume on a suction side, a compressor free volume on a discharge side, an oil amount in the compressor, a low side pressure, an outdoor temperature, an indoor dry bulb temperature, an indoor wet bulb temperature, a vapor saturated temperature, an amount of superheat at a compressor suction line, an electric motor size, an electric motor efficiency or a line voltage as a further indicator of the amount of refrigerant.

11. (Original) The system of claim 7, including a compressor, a condenser downstream of the compressor and an evaporator upstream of the compressor.

12. (Original) The system of claim 7, wherein the controller provides an indication when the amount of refrigerant in the system is outside of an acceptable range.

13. (Original) The system of claim 7, wherein the refrigerant system operates in a cooling mode.

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14. (Original) The system of claim 7, wherein the refrigerant system operates in a heating mode.
15. (New) The method of claim 1, wherein a warning signal is produced if the determination is made that the amount of refrigerant within the system is not as desired.
16. (New) The method of claim 15, wherein said warning signal is visual.
17. (New) The method of claim 15, wherein said warning signal is audio.
18. (New) The system of claim 7, wherein a warning signal is produced if a determination is made that the amount of refrigerant within the system is different from the desired amount.
19. (New) The system of claim 18, wherein said warning signal is visual.
20. (New) The system of claim 18, wherein said warning signal is audio.